Chapter 6
Artillery

This chapter provides the basic characteristics of selected artillery weapon systems either in use or readily available to the OPFOR. Therefore, the artillery systems discussed in this chapter are those likely to be encountered by U.S. forces in varying levels of conflict. The selection of artillery systems is not intended to be all-inclusive, rather a representative sampling of weapons and equipment supporting various military capabilities.

This update is divided into the following categories—artillery reconnaissance, towed artillery systems, mortar/gun-mortar systems, and multiple rocket launchers. Later updates of this guide will include data sheets addressing the aforementioned categories as well as ground mounted mortars, artillery locating radars, sound and flash systems, and surface-to-surface missiles (SSMs).

Questions and comments on data listed in this chapter should be addressed to:

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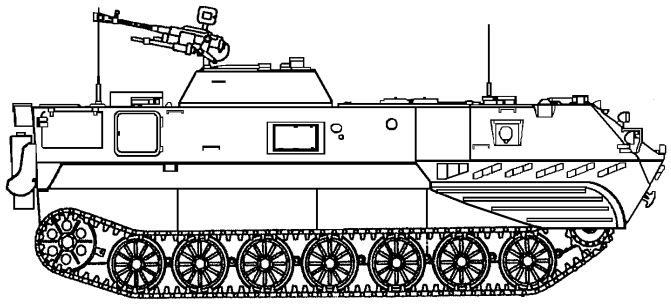
Russian Artillery Command and Reconnaissance Vehicle 1V13



Weapons &Ammunition Types	Typical Combat Load
12.7-mm DShK MG	**500**

SYSTEM
Alternative Designations: M1974-1
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 6
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.62
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240 hp diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): Amphibious

Radio: R-123M radio (3 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 12.7-mm heavy machinegun, DShK
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
- Day: 1,500
- Night: N/A

Fire on Move: Yes
Rate of Fire (rpm): 80-100 (practical)

VARIANTS
1V13M: INA

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

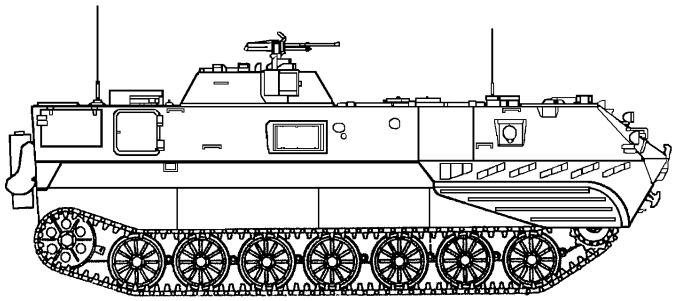
Fire direction:
- Automated: APK automated firing data receiver
- Manual: PUO-7

Other equipment: DSP-30 rangefinder, K-1 collimator, roof mounted periscopic aiming circle, VOP-7 vision blocks and driver's periscopes.

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer's vehicles, three 1V14 battery commander's vehicles, one 1V15 battalion commander's vehicle, and one 1V16 battalion FDC/chief of staff's vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The ACRV 1V13 is the battery FDC of the 1V12 ACRV Complex. The battery senior officer, assisted by fire direction and communications personnel mans the vehicle. It has direct radio communications with the battery COP, the battalion COP, and the battalion FDC. The vehicle is equipped with a land navigation system and has a roof mounted periscopic aiming circle. The roof mounted periscopic aiming circle allows the battery senior officer the ability to lay the howitzers for direction from within his vehicle. There is no battlefield observation equipment present on the 1V13.

Russian Artillery Command and Reconnaissance Vehicle 1V14/1V15



Weapons &Ammunition Types	Typical Combat Load
7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: M1974-2A (1V14), M1974-2B (1V15)
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 1V14 (6)/1V15 (7)
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.26
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240hp diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): Amphibious

Radios:
- 1V14: R-123M (3 each), R-107M (1 each)
- 1V15: R-123M (2 each), R-107M (1 each), R-111 (1 each), R-130M (1 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
- Day: 1,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic), 2-10 round bursts

VARIANTS
1V14M/1V15M: INA

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

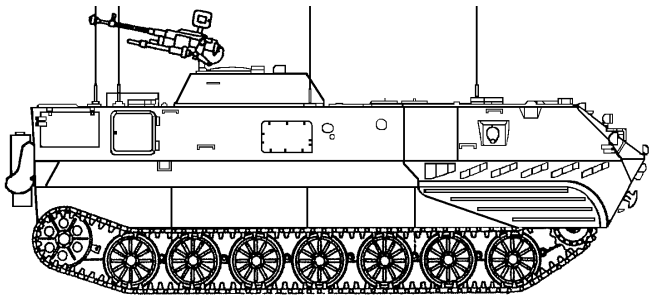
Fire direction:
- Automated: 1V520.
- Manual: PUO-7

Other equipment: 1D15 laser rangefinder, DSP-30 rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder, VOP-7 vision blocks and driver's periscopes.

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer's vehicles, three 1V14 battery commander's vehicles, one 1V15 battalion commander's vehicle, and one 1V16 battalion FDC/chief of staff's vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The ACRV 1V14 and ACRV 1V15 are the battery and battalion commander's vehicles of the 1V12 ACRV Complex. Both vehicles are equipped with the 1T121 land navigation system, a 1D15 laser rangefinder, and the 1PN44 day/night sight mounted in a basketed turret. The observer uses an analog coordinate converter to translate the polar location data when determining rectangular target coordinates. The 1V14 has an internal power generator. The 1V15 can be distinguished from the 1V14 by the external antenna bracket on the rear of the vehicle. The 1V520 fire direction computer may be transported internally and dismounted at a command observation post. The artillery commander, assisted by target acquisition, fire direction and communications personnel mans the vehicle. The artillery commander decides how to attack targets of opportunity and targets relayed to him by the supported maneuver unit.

Russian Artillery Command and Reconnaissance Vehicle 1V16



Weapons &Ammunition Types	Typical Combat Load
12.7-mm DShK MG	**500**

SYSTEM
Alternative Designations: M1974-3
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 7
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.26
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240hp diesel
Cruising Range (km): 500 km
Speed (km/h):
Max Road: 60
Max Off-Road: 26
Cross-Country: INA
Max Swim: 4.5
Fording Depths (m): Amphibious

Radios:
R-123M (2 each), R-111M (1 each),
R-130M (1 each, R-326 receiver (1 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 12.7-mm HMG, DShK
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
Day: 1,500
Night: N/A
Fire on Move: Yes
Rate of Fire (rpm): 80-100 (practical)

VARIANTS
1V16M: INA

SENSORS/COMPONENTS

Fire direction:
Automated: 9V59
Manual: PUO-7

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer's vehicles, three 1V14 battery commander's vehicles, one 1V15 battalion commander's vehicle, and one 1V16 battalion FDC/chief of staff's vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The 1V16 is the simplest of the vehicles in the 1V12 ACRV Complex and serves as the battalion FDC/chief of staff's vehicle. Normally, the battalion chief of staff, assisted by fire direction and communication personnel mans the vehicle. It has neither battlefield observation optics nor a navigation system. However, the vehicle is equipped with the standard VOP-7 vision blocks and driver's periscopes. It is equipped with extra radios and has an extendable antenna mast mounted on the vehicle rear. The 9V59 fire-direction computer is mounted in the vehicle.

The 9V59 fire-control computer comes in several different models believed to be designated as the 9V59-1, -2, and –3. For example, the 9V59-2 is associated with 152-mm artillery units. The 9V59 fire-control computer is probably a 4-bit computer and, although quite rugged, is assessed to have a low mean time between failures because of a large number of discrete components. The 1V510 is assessed to be a replacement for the 9V59 fire-control computer. The 1V510 is capable of performing survey calculations and technical firing data. The system is assessed to be 33% faster than the 9V59.

Russian Artillery Command and Reconnaissance Vehicle 1V18/1V19

Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-2A (1V17), M1979-2B (1V18)
Date of Introduction: 1979
Proliferation: At least 1 country
Description:
Crew: 6
Platform (chassis): BTR-60PB
Combat Weight (mt): 10.1
Chassis Length Overall (m): 7.22
Height Overall (m): 2.06
Width Overall (m): 2.82

Automotive Performance:
Engine Type: 2 GAZ-49B 90 hp(180 hp total) in-line, water-cooled gasoline
Cruising Range (km): 500 km
Speed (km/h):
Max Road: 80
Max Off-Road: 60
Cross-Country: INA
Max Swim: 10
Fording Depths (m): Amphibious

Radio:
1V18: R-123M (3 each), R-107M (1 each)
1V19: R-123M (2 each), R-107M (1 each), R-111 (1 each), R-130M (1 each)

Protection:
Armor, Turret Front (mm): INA
Armor Turret Top (mm): INA
Armor Hull (mm): INA
NBC Protection System: Yes
Smoke Equipment: No

VARIANTS None

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

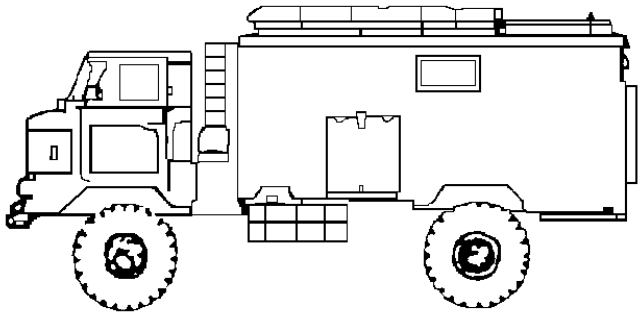
Fire direction:
Automated: 1V520
Manual: PUO-7

Other equipment: 1D15 laser rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder

NOTES
In 1979, the Soviet Union introduced a similar wheeled ACRV set for multiple rocket launcher and towed cannon units. The eight-vehicle set consists of three 1V110 battery senior officer's vehicles, three 1V18 battery commander's vehicles, one 1V19 battalion commander's vehicle, and one 1V111 battalion chief of staff's vehicle. Early versions of the 1V17 ACRV set included a 1V111 equipped with a modified ZIL-130-mounted 9S77M instead of the ZIL-131. There have been no upgrades to the 1V17 like that of the 1V12 to 1V12M.

The ACRV 1V18 and 1V19 are the battery and battalion commander's vehicles of the 1V17 ACRV Complex. Both vehicles are equipped with the 1T121 land navigation system, a 1D15 laser rangefinder, and the 1PN44 day/night sight. The observer uses an analog coordinate converter to translate the polar location data when determining rectangular target coordinates. The 1V520 fire direction computer may be transported internally and dismounted at a command observation post.

Russian Artillery Command and Reconnaissance Vehicle 1V110 _____



Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-1
Date of Introduction: 1979
Proliferation: At least 1 country
Description:
Crew: 5
Platform (chassis): GAZ-66B, 4x4 wheeled, Box Body Van
Combat Weight (mt): 3.6
Chassis Length Overall (m): 5.66
Height Overall (m): 2.44
Width Overall (m): 2.34

Automotive Performance:
Engine Type: ZMZ-66, 115 hp V-8, water-cooled, gasoline
Cruising Range (km): 875 km
Speed (km/h):
Max Road: 87
Max Off-Road: 35
Cross-Country: INA
Fording Depths (m): .80

Radio: R-123M radio (3 each)

VARIANTS
None

SENSORS/COMPONENTS
Navigation: See NOTES.

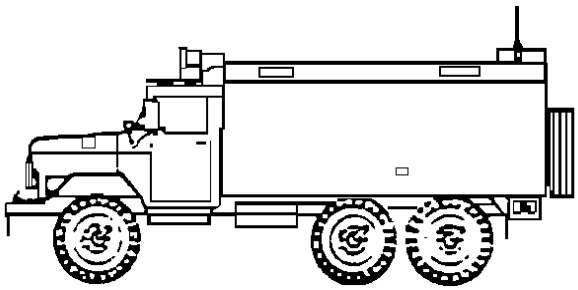
Fire direction: No computation system is installed. The vehicle is equipped with the APK automated firing data receiver.

Other equipment: DSP-30 laser rangefinder, K-1 collimator

NOTES
In 1979, the Soviet Union introduced a similar wheeled ACRV set for multiple rocket launcher and towed cannon units. The eight-vehicle set consists of three 1V110 battery senior officer's vehicles, three 1V18 battery commander's vehicles, one 1V19 battalion commander's vehicle, and one 1V111 battalion chief of staff's vehicle. Early versions of the 1V17 ACRV set included a 1V111 equipped with a modified ZIL-130-mounted 9S77M instead of the ZIL-131. There have been no upgrades to the 1V17 like that of the 1V12 to 1V12M.

The ACRV 1V110 battery FDC serves the same function as the ACRV 1V13 (1V12 ACRV Complex) and is similarly equipped. However, the land navigation system is a different model.

Russian Artillery Command and Reconnaissance Vehicle 1V111 _____



Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-3
Date of Introduction: 1979
Proliferation: At least 1 country
Description:
Crew: 7
Platform (chassis): ZIL 131 6x6 box body van
Combat Weight (mt): 6.7
Chassis Length Overall (m): 6.90
Height Overall (m): 2.48
Width Overall (m): 2.50

Automotive Performance:
Engine Type: ZIL 131 61, 150 hp V-8, water-cooled, gasoline
Cruising Range (km): 850 km
Speed (km/h):
Max Road: 80
Max Off-Road: 35
Cross-Country: INA
Fording Depths (m): 1.4

Radio: R-111M (I each), R-123M (2 each) radios; R-130M short-wave radio (1 each), and R-326 receiver (1 each)

VARIANTS
None

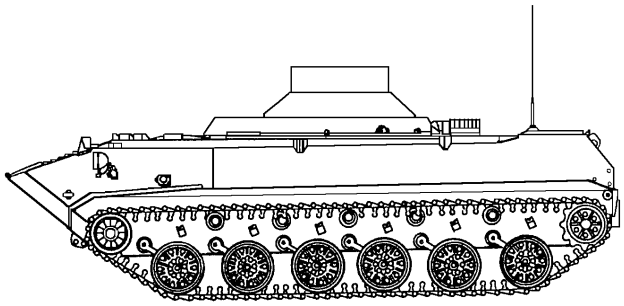
SENSORS/COMPONENTS

Fire direction: 9V59 fire-control computer

NOTES
In 1979, the Soviet Union introduced a similar wheeled ACRV set for multiple rocket launcher and towed cannon units. The eight-vehicle set consists of three 1V110 battery senior officer's vehicles, three 1V18 battery commander's vehicles, one 1V19 battalion commander's vehicle, and one 1V111 battalion chief of staff's vehicle. Early versions of the 1V17 ACRV set included a 1V111 equipped with a modified ZIL-130-mounted 9S77M instead of the ZIL-131. There have been no upgrades to the 1V17 like that of the 1V12 to 1V12M.

The ACRV 1V111 battalion FDC/chief of staff's vehicle serves the same function as the ACRV 1V16 (1V12 ACRV Complex) and houses the fire-direction computer. Like the 1V16, it is the simplest of the vehicles in the 1V17 ACRV Complex and lacks a land navigation system.

Russian Artillery Command and Reconnaissance Vehicle 1V119 _____



Artist Drawing From Photo

Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: 1V119 Spektr
Date of Introduction: 1981
Proliferation: At least 1 country
Description:
Crew: 6
Platform (chassis): BMD-1
Combat Weight (mt): 6.7
Chassis Length Overall (m): 5.88
Height Overall (m): 1.97
Width Overall (m): 2.63

Automotive Performance:
Engine Type: Type 5D20, 240 hp V-6, liquid-cooled diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 61
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: 10

Fording Depths (m): Amphibious

Radio: R-123M (3 each), R-107M (1 each)

Protection:
Armor, Turret Front (mm): INA
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

VARIANTS None

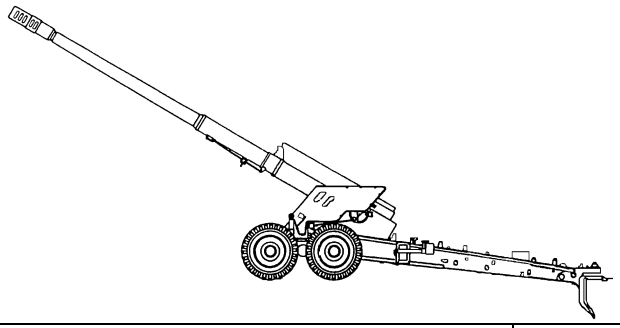
SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

Fire direction:
- Automated: 1V520.
- Manual: PUO-7

Other equipment: 1D15 laser rangefinder, DSP-30 rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder, VOP-7 vision blocks and driver's periscopes.

NOTES
The ACRV 1V119 is associated with the deployment of the 2S9 Nona-S 120-mm Combination Gun and can be parachute landed with airborne troops. The 1V119's sensor and fire direction package is similar to the ACRV 1V14. The 1V118 Reostat is classified as a command and reconnaissance vehicle and is not associated with an ACRV complex.

Russian 152-mm Towed Gun 2A36



Weapons &Ammunition Types	Typical Combat Load
152-mm gun Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: 2A36 Giatsint-B
Date of Introduction: 1981
Proliferation: At least 11 countries
Description:
Crew: 8
Carriage: 2A36
Combat Weight (mt): 9.80
Chassis Length Overall (m):
Travel Position: 12.9
Firing Position: 11.0
Height Overall (m): 2.7
Width Overall (m):
Travel Position: 2.7
Firing Position: 8.7
Towing Speed (km/h):
Max Road: 70
Max Off-Road: 20
Max Cross-Country: 15
Fording Depths (m): .6
Emplacement Time (min): 5
Displacement Time (min): 7

Prime Mover: KrAZ-4556, KrAZ-255B, or AT-S tractor

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, cannon
Barrel Length (cal): 49
Rate of Fire (rpm):
Burst: 6
Normal: 5
Sustained: 4
Loader Type: Semi-automatic
Breech Type: Horizontal sliding wedge
Muzzle Brake Type: Multi baffle
Traverse (°):
Left: 25
Right: 25
Total: 50
Elevation (°) (-/+): -2/+57°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Direct Fire: N/A
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS: None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF-39 (RAP)
Indirect Fire Range (m):
Minimum Range: 9,100
Maximum Range: 28,400
Complete Projectile Weight (kg): 43.51 (OF-29)
Muzzle Velocity (m/s): 945
Fuze Type: V-429 PD

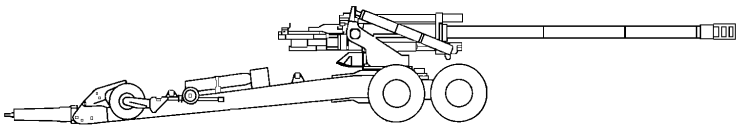
Caliber, Type, Name:
152-mm, HEAT, BP-540
Direct Fire Range (m):
Minimum Range: 0
Maximum Range: 1,000
Armor Penetration (mm): INA
Complete Projectile Weight (kg): 27.00
Muzzle Velocity (m/s): 655
Fuze Type: GPV-3 PD

Caliber, Type, Name:
152-mm Frag-HE, OF-86
Indirect Fire Range (m):
Minimum Range: 0
Maximum Range: 30,500
Complete Projectile Weight (kg): 43.8 (OF-59)
Muzzle Velocity (m/s): 945
Fuze Type: V-429 PD

Other Ammunition Types: DPICM, DPICM-BB, Incendiary, Chemical, Flechette, Semi-active laser-guided Krasnopol-M Frag-HE

NOTES
The most distinguishing feature of the 2A36 is its lower carriage. The large system weight required the use of tandem "walking-beam" axles and four wheels to provide mobility. A hydraulically powered firing pedestal is mounted on the front of the lower carriage and serves as part of the travel lock (similar to the D-20). Although the trails do not have the folding summer spades of the D-20, they do have two large spades similar to those found on the M-46/M-47. The weight of the 2A36 normally requires it to be towed by a heavy truck (like the KrAZ-255B). The KrAZ-255B is equipped with a special winch used to lift the trails in order to attach the gun's lunette to the towing pintle.

Austrian 155-mm Towed Gun-Howitzer GH N-45



Weapons &Ammunition Types	Typical Combat Load
155-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: None
Date of Introduction: 1980
Proliferation: At least 9 countries
Description:
Crew: 6
Carriage: GH N-45
Combat Weight (mt):
GH N-45: 8.90
GH N-45 APU: 11.00
Chassis Length Overall (m):
Travel Position: 9.06
Firing Position: 11.53
Travel Position (GH N-45 APU): 9.55
Firing Position (GH N-45 APU): 11.53
Height Overall (m): (at 0º elevation)
Travel Position: 2.15
Firing Position: 2.20
Travel Position (GH N-45 APU): 2.15
Firing Position (GH N-45 APU): 2.20
Width Overall (m):
Travel Position: 2.50
Firing Position: 9.93
Travel Position (GH N-45 APU): 2.75
Firing Position (GH N-45 APU): 9.93
Towing Speed (km/h):
Max Road: 90
Max Off-Road: 50
Max Cross-Country: 15
Fording Depths (m): .6
Emplacement Time (min): 4
Displacement Time (min): 4

Auxiliary Propulsion Unit Performance:
Engine Type: 125 hp air-cooled diesel
Cruising Range (km): 150
Speed (km/h):
Max Road: 35
Max Off-Road: INA
Cross-Country: 3
Max Swim: N/A

Prime Mover: 10 ton 6x6 truck or artillery tractor

ARMAMENT
Main Armament:
Caliber, Type, Name: 155-mm, cannon
Barrel Length (cal): 45
Rate of Fire (rpm):
Burst: 7
Normal: 3
Sustained: 2
Loader Type: Semi-automatic
Breech Type: Interrupted screw
Muzzle Brake Type: Multi-baffle
Traverse (°):
Left: 30
Right: 40
Total: 70
Elevation (°) (-/+): -5/+72°

FIRE CONTROL
Indirect Fire: Digital Panoramic Telescope
Direct Fire: Trunnion mounted telescopic sight
Collimator: INA
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
GH N-45 A1 Upgrade of GH N-45 (See NOTES)

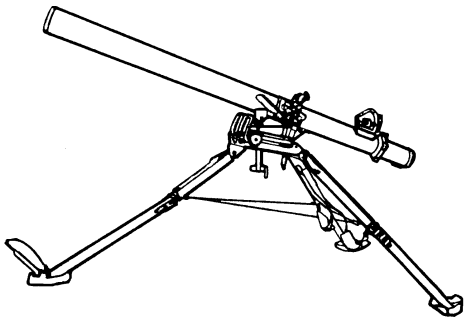
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
155-mm Frag-HE, SN-101
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 25,100
Complete Projectile Weight (kg): 42.3
Muzzle Velocity (m/s): 897
Fuze Type: PD

Caliber, Type, Name:
155-mm Frag-HE ERFB
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 39,600
Complete Projectile Weight (kg): 45.4
Muzzle Velocity (m/s):: 895
Fuze Type: PD

Other Ammunition Types: See NOTES

NOTES
The GH N-45 is fully compatible with NATO standard 155-mm ammunition. The APU, combined with the tandem walking-beam suspension, gives the GH N-45 excellent self-propelled mobility over short distances. The four wheels are all powered and give the gun excellent traction over most terrain. But, the APU serves purposes other than mobility. It provides power to open and close the trails, raise and lower the trail wheels, and raise and lower the firing platform. However, there is no power traverse or elevation. The GH N-45 also includes an optional chain system (reducing the ground pressure) to improve cross-country mobility in deep, muddy, or sandy terrain. The GH N-45 A1 includes reliability modifications and performance improvements.

Russian 122-mm 1-Round Rocket Launcher 9P132



Weapons &Ammunition Types	Typical Combat Load
122-mm rocket	**1**
Frag-HE	

SYSTEM
Alternative Designations: DKZ-66, BM-21P, Grad-1P, 9K510
Date of Introduction: Mid to late 1960's
Proliferation: At least 5 countries

Description:
Crew: 4-5 (includes ammunition bearers)
Combat Weight (kg):
Loaded: 101
Unloaded: 55
Length (m): 2.50
Width (m): 1.53
Height (m): 1.00
Emplacement Time (min): 2.5
Displacement Time (min): 2

Radio: R-107M

ARMAMENT
Launcher:
Caliber, Type, Name: 122-mm, 9P132
Number of Tubes: 1
Launch Rate: 1 round per minute
Loader Type: Manual
Reload Time: .67 minutes (approximately 40 seconds)
Traverse(°):
Left: 7
Right: 7
Total: 14
Elevation (°) (-/+): +10/+40°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1

VARIANTS
None

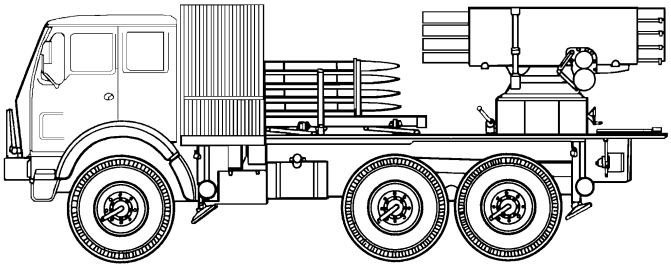
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
122-mm Frag-HE, 9M22M
Indirect Fire Range (m):
Minimum Range: 3,000
Maximum Range: 10,800
Warhead Weight (kg): 19.4
Rocket Length: (m): 1.90
Maximum Velocity (m/s):: 450
Fuze Type: PD

Caliber, Type, Name:
122-mm Illuminating Rocket Projectile, 9M42
Indirect Fire Range (m):
Minimum Range: 1,000
Maximum Range: 5,000
Rocket Weight (kg): 27
Rocket Length: (m): 1.90

Other Ammunition Types: Smoke

NOTES
The 9P132 is a lightweight, man-portable rocket launcher used by guerrilla, special purpose forces, or other light forces. The 9P132 is only effective as a harassment or interdiction weapon. When used to fire a new illumination rocket (9M42) the system has been referred to as the 9K510. The 9P132 is broken down for manpack transport into two one-man loads – the tube (27 kg) and the tripod sight assembly with a remote firing device (27 to 28 kg). The tripod legs also fold for ease of handling. Each 9M22M rocket is broken down into two one-man loads for transport. It takes approximately 2 minutes for assembly of the rocket. When assembled, the launcher has three course elevation positions, with the final elevation set by means of an elevation screw. The crew uses an electrical remote control with an electrical impulse generator and battery to fire the launcher. The 9P132 is incapable of firing the 9 foot version rockets of the BM-21 and similar 122-mm systems.

Yugoslav 128-mm Multiple Rocket Launcher M77



Weapons &Ammunition Types	Typical Combat Load
128-mm rocket	**32**
Frag-HE	

SYSTEM
Alternative Designations: M-77 Oganj
Date of Introduction: Early 1970's
Proliferation: At least 4 countries
Description:
Crew: 5
Chassis/Carriage: Modified FAP-2026 BDS/AV 6x6 wheeled
Combat Weight (mt): 22
Chassis Length Overall (m): 8.40
Height Overall (m): 3.10
Width Overall (m): 2.50

Automotive Performance:
Engine Type: Model 2F/002A, 200 hp water-cooled, 8-cylinder diesel engine
Cruising Range (km): 600
Speed (km/h):
- Max Road: 80
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 1.2
Emplacement Time (min): 3
Displacement Time (min): 2

Radio: R-123M

Protection:
Armor, Front (mm): None
Armor Side (mm): None
Armor Roof (mm): None
Self-Entrenching Blade: No
NBC Protection System: No
Smoke Equipment: No

ARMAMENT
Launcher:
Caliber, Type, Name: 128-mm
Number of Tubes: 32 (4 rows of 8 tubes)
Launch Rate:
Full Salvo Time: 32 rounds in 25.6 seconds
Single Rocket Interval: 8 seconds per rocket
Loader Type: Hydraulic
Reload Time: 2 minutes
Launcher Drive: Electric
Traverse: (°):
Left: 180
Right: 180
Total: 360
Elevation (°) (-/+): 0/+50°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1
Fire Control Computer: None
Position Location System: None

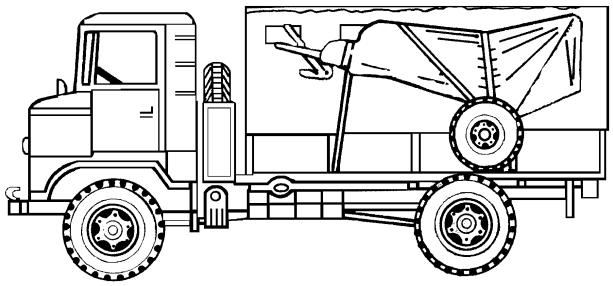
VARIANTS
128-mm Single Tube Launcher

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
128-mm Controlled Frag-HE
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 20,600
- Warhead Weight (kg): 20
- Rocket Length: (m): 2.60
- Maximum Velocity (m/s):: INA
- Fuze Type: PD

Other Ammunition Types: DPICM

NOTES
The M77 is configured and operated in the same manner as the Czechoslovakian 122-mm (40 round) multiple rocket launcher RM-70. The launcher is mounted over the rear axles with the reloader located behind the cab. During reloading, the launcher is rotated to the rear, two hydraulic cylinders raise the reloader, and then the rockets are pushed into the launcher. Unlike the RM-70, the M77 uses hydraulic cylinders rather than a sprocket and chain drive mechanism. The modified FAP2026 truck has four hydraulically emplaced firing jacks to provide firing stability. The rockets can be fired from inside the cab or with a remote-firing device. The M77 MRL is capable of mounting an antiaircraft machinegun for protection.

Russian 120-mm Self-Propelled Mortar 2S12



Weapons &Ammunition Types	Typical Combat Load
120-mm mortar Frag-HE Smoke Illumination	**48**

SYSTEM
Alternative Designations: 120-mm 2S12 Sani (Sled)
Date of Introduction: early 1980s
Proliferation: At least 1 countries
Description:
Crew: 5
Vehicle Platform (chassis): GAZ-66
Combat Weight (mt): 3.64
Chassis Length Overall (m): 5.66
Height Overall (m): 2.44
Width Overall (m): 2.34
2B11 Mortar
Combat Weight (kg): 210 (firing) /297 (traveling)
Wheeled Carriage 2L81 (kg): 87
Baseplate (kg): 80
Bipod (kg): 55

Automotive Performance:
Engine Type: ZMZ-66, 115 hp V-8 water cooled gasoline
Cruising Range (km): 600
Speed (km/h):
- Max Road: 87
- Max Off-Road: 35
- Cross-Country: INA

Fording Depths (m): .80
Emplacement Time (min): 3 (est)
Displacement Time (min): 3 (est)

Radio: R-123M

Protection:
Armor, Turret Front (mm): None
Armor Turret Top (mm): None
Armor Hull (mm): None
NBC Protection System: No
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 120-mm, mortar, 2B11
Rate of Fire (rpm):
Burst: 15
Normal: 10
Sustained: 4 (est)
Loader Type: Manual
Traverse (°):
- Left: 5 (on bipod)/26 (moving the bipod)
- Right: 5 (on bipod)/26 (moving the bipod)
- Total: 10 (on bipod)/52 (moving the bipod)

Elevation (°) (-/+): +45/+80°

FIRE CONTROL
Indirect Fire: MPM-44M
Direct Fire: INA
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
120-mm Frag-HE (3OF843B)
- Indirect Fire Range (m):
  - Minimum Range: 450
  - Maximum Range: 7,000
- Complete Projectile Weight (kg): 16.8
- Muzzle Velocity (m/s):: 325
- Fuze Type: GVMZ-7 PD

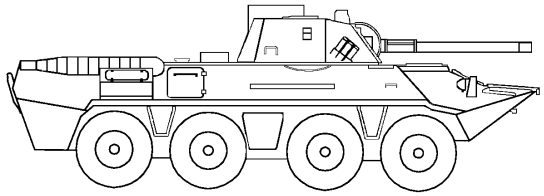
120-mm Smoke
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 6,800
- Complete Projectile Weight (kg): 16.7
- Muzzle Velocity (m/s):: INA
- Fuze Type: PD

120-mm Illumination, S-843
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 5,300
- Complete Projectile Weight (kg): 16.8
- Muzzle Velocity (m/s):: INA
- Fuze Type: T-1 TSQ

Other Ammunition Types: All standard 120-mm mortar rounds

NOTES
The 2S12 is a self-propelled version of the towed 120-mm mortar 2B11 (M-120) carried on the bed of GAZ-66 truck. The SP version provides greater mobility for this versatile mortar. The 2S12 has a special safety device to prevent double loading when the mortar round is not fired or removed from the tube. When a round is loaded, it trips a tab on the tube, preventing another round from being loaded. The tab shifts to the "ready" position when the round fires, allowing the 2S12 to be reloaded.

Russian 120-mm Self-Propelled Combination Gun 2S23



Weapons &Ammunition Types	Typical Combat Load
120-mm mortar	**30**
Frag-HE	
Smoke	
Illumination	
7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: 120-mm 2S23 Nona-SVK
Date of Introduction: 1990
Proliferation: At least 1 countries
Description:
Crew: 4
Platform (chassis): Modified BTR-80 APC
Combat Weight (mt): 14.5
Chassis Length Overall (m): 7.50
Height Overall (m): 2.75
Width Overall (m): 2.90

Automotive Performance:
Engine Type: 260 hp V-8 water cooled diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 80
- Max Off-Road: 60
- Cross-Country: 40
- Max Swim: 10

Fording Depths (m): Amphibious
Emplacement Time (min): 1 (est)
Displacement Time (min): 1 (est)
Radio: R-173

Protection:
Armor, Turret Front (mm): Against 12.7-mm
Armor Turret Top (mm): INA
Armor Hull (mm): INA
NBC Protection System: Yes
Smoke Equipment: Six 81-mm smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 120-mm, gun-mortar, 2A60
Barrel Length (cal): INA
Rate of Fire (rpm):
- Burst: 10
- Normal: 6
- Sustained: 4

Loader Type: autoloader
Breech Type: combined semi-automatic breechblock with wedge locking mechanism and powder gases plastic obturator
Muzzle Brake Type: None
Traverse (°):
- Left: 35
- Right: 35
- Total: 70

Elevation (°) (-/+): -4/+80°

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Coax
Direct Fire Range (m): 1,500
Max Effective Range (m)`:
- Day: 1,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic), 2-10 round bursts

FIRE CONTROL
Indirect Fire: INA
Direct Fire: INA
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
120-mm Frag-HE (3VOF49)
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 8,850
- Complete Projectile Weight (kg): 19.8
- Muzzle Velocity (m/s):: 367
- Fuze Type: B35 PD

120-mm, HEAT
- Direct Fire Range (m):
  - Minimum Range: 40
  - Maximum Range: 1,000
- Armor Penetration (mm): INA
- Complete Projectile Weight (kg): 13.20
- Muzzle Velocity (m/s):: 560
- Fuze Type: PD

120-mm Frag-HE rocket assisted
- Indirect Fire Range (m):
  - Minimum Range: 6,710
  - Maximum Range: 13,000
- Complete Projectile Weight (kg): 19.8
- Muzzle Velocity (m/s):: 367
- Fuze Type: B35 PD

Other Ammunition Types: All standard 120-mm rifled mortar rds

NOTES
2S23 has a device for loading projectiles from the ground. During traveling the device is externally attached on the right side near the side door.